

REMARKS

Claims 1, 2, 17, 27-29, and 32-34, as amended, and new claims 38-50, are pending for the Examiner's review and consideration. Claims 3-16, 20, 23, 24, 26, 30 and 35-37 have been cancelled herein without prejudice to Applicants' rights to file one or more continuing or divisional applications directed to this or other unclaimed subject matter. In the response dated November 17, 2004, Applicants elected the species of claims 6, 7, 17, and 30 and generic claims 1, 2, 15, 16, 27-29, and 32-34. Claims 18, 19, 21, 22, 25, and 31 are withdrawn, but these claims have been amended to be consistent with elected and currently amended claim 1. None of these changes introduce new matter.

The drawings were objected to on pages 2-4 of the Office Action. In particular, Figures 1-4 were alleged to be too dark and blurry, the figure labels and reference characters were handwritten and alleged to be unclear, and Figures 5-7 were hand-drawn in a manner that was alleged to be unclear. Figure 3 was also objected to because it includes the reference character "A," which is allegedly not mentioned in the description. Figure 3 has been amended to remove the reference character "A." In addition, Figures 1-7 have now been prepared formally, and copies are submitted herewith to substitute for those that were originally filed. Accordingly, Applicants request the examiner's approval and acceptance of the substitute drawings to overcome the current objection to the drawings.

In the Specification, various paragraphs have been amended to correct minor typographical errors and grammatical errors. Tradenames such as IRGACURE and DAROCURE in the Specification have also been capitalized and are accompanied by the generic technology, in accordance with the Examiner's suggestion on page 4 of the Office Action. These corrections are editorial in nature and do not introduce new matter.

Claim 1 has been amended to include the features of allowed claim 17, although in a more generic form. Specifically, claim 1 now recites a polymerizable substance comprising glycidyl ether in an amount of 0.1-85 wt% of the substance, epoxide in an amount of 5-90 wt% of the substance, and a first alcohol in an amount of 0-10 wt% of the substance, and wherein the solvent comprises a second alcohol that is different from the first alcohol. Claim 17 recites: (1) bis(4-glycidyloxyphenyl) methane, which is a glycidyl ether; (2) 1,2,7,8-diepoxyoctane, which is an epoxide; (3) neopentylglycol, which is an alcohol; and (4) a solvent that comprises 2-ethoxyethanol, 2-propanol and ethanol, which are alcohols that are different from neopentylglycol. Thus, claim 1 is generic to claim 17 but includes the features which render that claim patentable over the cited art of record.

The specific weight percentages in amended claim 1 are supported in the Specification. Glycidyl ether present in an amount of 0.1 wt% is found in Example 8, which states that glycerol proxylate triglycidyl ether is present in 0.1 wt%. Support for a glycidyl ether present in an amount of 85 wt% is found in Example 5, which states that 70 wt% of bisphenol A diglycidyl ether and 15 wt% of 1,4-butanediol diglycidyl ether are used. Similarly, an epoxide in an amount of 5 wt% is found in Example 5 (5 wt% of bis(3,4-epoxycyclohexylmethyl) adipate) and an epoxide in an amount of 90 wt% is found in Example 9 (90 wt% of 3,4-epoxycyclohexylmethyl-3,4-epoxycyclohexane-carboxylate). A first alcohol in an amount of 0 wt% is found in Examples 4, 8, and 11 (no first alcohol present), while 10 wt% of a first alcohol is found in Examples 3, 5, and 7 (neopentylglycol, neopentyl glycol ethoxylate, and poly(caprolactone) triol). Support for the solvent that includes a second alcohol that is different from the first alcohol is found in Examples 3-6 and 8-12 in the Specification. The amendments made to claim 1 are therefore fully supported by the Specification.

Claims 2 and 32 were amended to correct minor typographical errors. Claims 17-19, 21, 22, and 25 were amended to change the claim dependency from cancelled claim 16 to claim 1. Claims 17-19, 21, 22, 25, 31, 33, and 34 were amended to clarify what kind of percentage value is required and what the percentage values are measured in relation to. Claim 27 was amended to remove the features already recited in amended claim 1. Claim 33 was further amended to replace IRGAURE 1700 with a mixture that is 25% by weight bis(2,6-dimethoxybenzoyl)-2,4,4- trimethylpentylphosphine oxide and 75% by weight of 2-hydroxy-2-methyl-1-phenylpropan-1-one (*See, e.g.*, U.S. Publication No. 2005/0047740, paragraph [0058]).

New independent claim 38 is based on original claim 6, and recites a polymerizable composition that comprises alkylacrylate and triacrylate in a ratio of about 1:0.25 to 1:16, and a photoinitiator. Original claim 6 included oligocarbonate methacrylate (alkylacrylate) and aliphatic urethane triacrylate (triacrylate). Example 16 in the Specification provides support for the 1:16 ratio. Example 16 provides 5 wt% of (2-(2-ethoxyethoxy)ethylacrylate (alkylacrylate), and 23 wt% of modified urethane triacrylate and 57 wt% of propoxylated trimethylolpropane triacrylate (triacrylates). Example 20 in the Specification provides support for the about 1:0.25 ratio. Example 20 provides 58 wt% of oligocarbonate methacrylate (alkylacrylate) and 15 wt% of trimethylolpropane triacrylate (triacrylate). Claim 38 is thus fully supported by the Specification.

New claim 39 is also based on objected original claim 6, and recites that the photoinitiator is present in an amount of 2-4 wt% of the polymerizable composition. Example 20 provides for 4% of a photoinitiator (2% IRGACURE 500 and 2% triarylsulfonium hexafluorophosphate) while original claim 6 provides for 2% of a photoinitiator (2% IRGACURE 651). New claim 40 is also based on original claim 6, and recites the features of original claim 6, except that IRGACURE 651 has been replaced with 2,2,-dimethoxy-1,2-diphenylethan-1-one (*See, e.g.*, U.S. Patent No. 6,870,062 at Col. 30, line 12). The amounts in claim 40 are approximate amounts (80%, 20% and 2% total more than 100%), such that the use of the term "about" is warranted. New claim 41 finds support in Example 20. Instead of IRGACURE 500, however, claim 41 recites a mixture of 50% by weight 1-hydroxycyclohexyl phenyl ketone and 50% by weight benzophenone (*See, e.g.*, U.S. Patent No. 6,863,848 at Col. 18, lines 21-23). New claim 42 is based on original claim 7 and recites that the photoinitiator comprises a quinone, an amine, or a mixture of an amine and quinone. New claim 43 is also based on original claim 7 and recites that the quinone is present in an amount of 2 wt% and the amine is present in amount of 1 wt% (*See, e.g.*, Examples 22 and 23). New claim 44 recites specific quinones and a specific amine (*See, e.g.*, Examples 22 and 23 and original claims 7 and 8). New claim 45 is based on original claim 5, but instead of IRGACURE 784, the claim recites bis(η 5-2,4-cyclopentadien-1-yl)-bis(2-6-difluoro-3-(1H-pyrrol-1-yl)-phenyl)titanium (*See, e.g.*, U.S. Patent No. 6,863,848 at Col. 18, lines 30-33). The amounts in claim 45 are approximate amounts (23%, 5%, 15%, 57%, and 2% total more than 100%), such that the use of the term "about" is warranted. New claim 46 is based on original claim 9, and recites the chemical compound instead of IRGACURE 651.

New independent claim 47 is based on objected original claim 30 and recites that the filling composition comprises polyacrylic acid in an alcohol solution, wherein the polyacrylic acid is present in an amount sufficient to form a photosolidified layer. The polyacrylic acid is provided to form a photosolidified layer (*See, e.g.*, Specification at page 6, lines 11-13). Original claim 30 recites a 3 wt% polyacrylic acid solution in a mixture of 80% ethyl glycol and 20% isopropanol. New claims 48-50 are also based on original claim 30 and are supported by original claim 30, as well as Example 1 in the Specification.

New claims 38-50, as well as the amendments made to the original claims, are all fully supported by the Specification. No new matter has been introduced by any of the amendments or new claims herein, such that entry of the claim amendments and additions is warranted at this time.

Applicants note with appreciation the allowability of claim 17 if rewritten in independent form, including all of the limitations of the base claim and any intervening claims, and the allowability of claims 6, 7, and 30, if the claims are amended to overcome the 35 U.S.C. § 112, second paragraph rejections, as noted on page 15 of the Office Action.

Claims 6, 7, 30, 33, and 34 were rejected under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regards as the invention on page 5 of the Office Action.

Claims 6 and 7 were rejected because they contain the trademark/tradename IRGACURE. Claims 6 and 7 have been replaced with new claims 38-40 and 42-44.

Claim 6 was also rejected because it allegedly does not specify (1) what kind of percent value is required; and (2) what the percent values are measured in relation to. New independent claim 38 recites a specific ratio of components, and new claim 40 recites that the components are present in an amount of a certain weight percent of the polymerizable composition.

Claim 7 was rejected because it allegedly does not specify what the percent values of the components phenanthrenequinone and triethanolamine are measured in relation to. New claim 43 recites that a quinone is present in an amount of 2 weight percent of the polymerizable composition, and that an amine is present in an amount of 1 weight percent of the polymerizable composition.

Claim 30 was rejected because it allegedly does not specify what kind of percent value is used in conjunction with the ethyl glycol and isopropanol components and what the percent values are measured in relation to. Claim 30 has been replaced with new claims 47-50. New claim 47 recites that the filling composition includes polyacrylic acid in an alcohol solution. Claim 48 recites that the polyacrylic acid is present in an amount of 3 weight percent of the filling composition. Claim 50 recites that the alcohol solution is a mixture of 80 weight percent ethyl glycol and 20 weight percent isopropanol. Thus, it is clear that the filling composition includes 3 weight percent of the polyacrylic acid in a solution that is 80 weight percent ethyl glycol and 20 weight percent isopropanol.

Claim 34 was rejected because the claim allegedly does not specify (1) what kind of percent value is used, and (2) what the percent values are measured in relation to. Claim 34 has been amended to recite that the benzoyl peroxide is present in an amount of 4 weight percent of the polymerizable composition and the dibutylaniline is present in an amount of 0.1 weight percent of the polymerizable composition.

The changes mentioned above clearly overcome all formal rejections. Accordingly, Applicants respectfully request that the rejection under 35 U.S.C. § 112, second paragraph, be reconsidered and withdrawn.

Claims 1, 2, 15, 16, and 32 were rejected under 35 U.S.C. § 103(a) as being obvious over International Publication No. WO 98/50914 to Glushko et al. ("WO Glushko") in view of either Japanese Patent No. JP 03-173954A to Otaki ("Otaki") or U.S. Patent No. 6,023,451 to Kashiwagi et al. ("Kashiwagi") for the reasons set forth on pages 7-10 of the Office Action.

WO Glushko relates to methods for manufacturing a three-dimensional optical memory device formed of a plurality of spaced-apart data layers that includes the steps of (1) forming an upper surface of each of the substrates with a pattern comprising a plurality of regions which are capable of obtaining, when covered by a recording medium, desired optical properties different from those of the substrate; (2) coating the patterned surface of the substrate with the recording medium; (3) removing the recording medium from the patterned surface after the recording regions have obtained the desired optical properties; and (4) providing an attachment between the data layers (Page 4, lines 12-25). The recording medium is formed of a liquid photopolymer (Page 6, lines 3-4).

Otaki describes how to produce a resin film by irradiating at least the outer peripheral positions of the resin film with UV rays throttled to a beam shape and scanning the beam in a circumferential direction, thereby curing the resin film (Abstract).

Kashiwagi relates to optical recording mediums and describes how to produce such a medium. A thin plate substrate is disposed on a rotation mount through the liquid ultraviolet curing resin, the stamper on which the thin plate substrate is laminated is rotated to draw the liquid ultraviolet curing resin to obtain a desired thickness (Col. 10, lines 49-54).

Independent claim 1 has been amended to recite a polymerizable substance that includes glycidyl ether in an amount of 0.1-85 wt% of the substance, epoxide in an amount of 5-90 wt% of the substance, and a first alcohol in an amount of 0-10 wt% of the substance, and the solvent comprises a second alcohol that is different from the first alcohol. This feature is not disclosed or suggested by WO Glushko, Otaki, or Kashiwagi, alone or in combination, as acknowledged by the Examiner on page 15 of the Office Action.

New independent claims 38 and 47 are similarly patentable over the prior art of record. Claim 38 recites a polymerizable composition that comprises alkylacrylate and triacrylate in a ratio of about 1:0.25 to 1:16, and a photoinitiator. Claim 47 recites a filling composition that includes polyacrylic acid in an alcohol solution. Both of these features are

not taught or suggested by WO Glushko, Otaki, or Kashiwagi, alone or in combination, as acknowledged by the Examiner on page 15 of the Office Action.

Because the prior art of record does not teach or suggest each and every single feature recited in the claims, a *prima facie* case of obviousness has not been made. Accordingly, Applicants respectfully request that this rejection under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Claims 27 and 28 were rejected under 35 U.S.C. § 103(a) as being obvious over WO Glushko in view of either Otaki or Kashiwagi, and further in view of U.S. Patent No. 6,368,684 to Onishi et al. ("Onishi") for the reasons set forth on pages 10-12 of the Office Action. Onishi is relied on to teach the filling step recited in the claims.

Onishi describes a method of forming a fluorescent latent image transfer film. The method includes putting, onto a transfer receiving material, a fluorescent latent image transfer film wherein a fluorescent ink layer formed of a resin binder comprising a fluorescent agent is deposited on/above a heat-resistant substrate film; heating the resultant product in any pattern from the heat-resistant substrate film side of the fluorescent latent image transfer film by means of a heating element to transfer the fluorescent ink layer of the fluorescent latent image transfer film, correspondingly to the pattern of the heating element, onto the transfer receiving material, thereby forming a fluorescent latent image composed of the fluorescent agent on the transfer receiving material (Col. 3, lines 32-46). Onishi discloses that binder resins like cellulose resins such as ethylcellulose, ethylhydroxycellulose, hydroxypropylcellulose, methylcellulose and cellulose acetate; vinyl resins such as polyvinyl alcohol, polyvinyl acetate, polyvinyl butyral, polyvinyl acetal and polyvinyl pyrrolidone; acrylic resins such as poly (meth)acrylate and poly (meth)acrylamide; polyurethane resins; polyamide resins; polyester resins; and mixtures thereof can be used in a fluorescent ink layer (Col. 8, lines 25-33). Examples of resins that can be dyed with dye include saturated polyester, polyamide, polyacrylate, polycarbonate, polyurethane, polyvinyl acetal, polyvinyl chloride, vinyl chloride/vinyl acetate copolymer, polyvinyl acetate, polystyrene, styrene/acrylate copolymer, styrene/butadiene copolymer, vinyltoluene/acrylate copolymer, and cellulose resin (Col. 14, lines 34-39).

As discussed above, claim 1 recites glycidyl ether in an amount of 0.1-85 wt% of the substance, epoxide in an amount of 5-90 wt% of the substance, and a first alcohol in an amount of 0-10 wt% of the substance, and the solvent comprises a second alcohol that is different from the first alcohol. WO Glushko, Otaki, or Kashiwagi do not teach or suggest all of the claimed features in independent claim 1. Onishi does not remedy this deficiency, even

with its long recitation of resin materials. As claims 27 and 28 depend from claim 1, they are similarly not obvious over WO Glushko, in combination with Otaki or Kashiwagi, and further in view of Onishi.

New claims 38 and 47 are also not rendered obvious by the teaching of the cited references. Claim 38 recites alkylacrylate and triacrylate in a ratio of about 1:0.25 to 1:16, and a photoinitiator, while claim 47 recites a filling composition that includes polyacrylic acid in an alcohol solution. None of the cited references teach these same exact features.

Accordingly, Applicants respectfully request that this rejection under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Claim 29 was rejected under 35 U.S.C. § 103(a) as being obvious over WO Glushko in view of either Otaki or Kashiwagi, and further in view of Onishi, and further in view of either U.S. Patent No. 6,071,671 to Glushko et al. ("US Glushko") or U.S. Patent No. 5,801,884 to Sato et al. ("Sato") for the reasons set forth on page 12 of the Office Action. US Glushko and Sato are relied on to teach the fluorescent dye oxazine 1.

US Glushko relates to methods of manufacturing an optical memory device that employs a fluorescent medium (Col. 1, lines 10-15). Fluorescent dyes such as Carbazine 122, Pyridin 1, Nile Blue, DQOCI, Rhodamine 6G, Rhodamine 800, DCI-2, Styryl 6, Oxazine 750, DTDCI, Phenoxazon 9 are disclosed (Col. 11, lines 56-59).

Sato relates to an optical device and a process for producing the device, and more particularly to an optical device such as a microlens array or a grating lens for use in an optical communication system, an optical circuit, a liquid crystal display panel, a copying machine or the like (Col. 1, lines 5-10). Sato discloses a variety of fluorescent dyes, including oxazine 1 (Col. 5, line 15). Moreover, Sato discloses the following photo-curable monomers: multi-functional acrylate or methacrylate compounds having a plurality of acryloyl or methacryloyl groups, such as triethylene glycol-diacrylate, triethylene glycol-dimethacrylate, hexane diol-acrylate, hexane diol-methacrylate, 2,2-bis(4-acryloyl-oxy-phenyl)propane, 2,2-bis(4-methacryloyl-oxy-phenyl)propane, 2,2-bis(4-(2-acryloyl-oxy-ethoxy)phenylpropane, 2,2-bis(4-(2-methacryloyl-oxy-ethoxy)phenyl]propane, p-bis(β-acryloyl-oxy-ethylthio)xylene, p-bis(β-methacryloyl-oxy-ethylthio)xylene, 4,4'-bis(β-acryloyl-oxy-ethylthio)diphenyl sulfone, 4,4'-bis(β-methacryloyl-oxy-ethylthio)diphenyl sulfone, trimethylol propane-triacrylate, trimethylol propane-trimethacrylate, urethane acrylate and epoxy acrylate, a mixture of any of these multi-functional acrylate or methacrylate compounds and a monofunctional monomer copolymerizable therewith, and a

mixture of any of these multi-functional acrylate or methacrylate compounds and polythiol capable of addition-polymerization therewith (Col. 3, lines 45-63); and methyl acrylate, methyl methacrylate, benzyl acrylate, benzyl methacrylate, pentaerythritol-tetrakis(β-thiopropionate), tris(2-(β-thiopropionyl-oxy)ethyl]isocyanurate (Col. 3, line 65 to Col. 4, line 5).

Claim 29, however, depends from claim 1, which has already been shown to be non-obvious over WO Glushko in view of either Otaki or Kashiwagi, and further in view of Onishi. US Glushko and Sato do not remedy this deficiency as they do not teach or suggest a polymerizable substance that includes glycidyl ether in an amount of 0.1-85 wt% of the substance, epoxide in an amount of 5-90 wt% of the substance, and a first alcohol in an amount of 0-10 wt% of the substance, and the solvent comprises a second alcohol that is different from the first alcohol.

New claims 38 and 47 are similarly not rendered obvious over a teaching of WO Glushko in view of either Otaki or Kashiwagi, and further in view of Onishi, and further in view of US Glushko and Sato.

Accordingly, Applicants respectfully request that this rejection under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Claim 33 was rejected under 35 U.S.C. § 103(a) as being obvious over WO Glushko in view of either Otaki or Kashiwagi, and in further view of U.S. Patent No. 6,355,754 to Olson et al. ("Olson") for the reasons set forth on page 13 of the Office Action. Olson is relied on to teach that the polymerizable composition is doped with 3% IRGACURE 1700.

Olson provides polymerizable compositions having a high index of refraction, and preferably, high index of refraction polymerizable compositions that can be processed at temperatures at or near room temperature to produce a polymer or polymeric material (Col. 1, lines 55-61). The polymerizable composition contains brominated, high index of refraction monomers, and in particular alkyl-substituted brominated phenolic (meth)acrylate monomers (Col. 1, lines 61-66).

Claim 33 depends from claim 1, which has already been shown to be non-obvious over WO Glushko in view of either Otaki or Kashiwagi. Olson does not remedy this deficiency. Claims 38 and 47 are similarly not rendered obvious by the disclosure of WO Glushko in view of either Otaki or Kashiwagi, and further in view of Olson.

Accordingly, Applicants respectfully request that this rejection under 35 U.S.C. § 103(a) be reconsidered and withdrawn.

Finally, claim 34 was rejected under 35 U.S.C. § 103(a) as being obvious over WO Glushko in view of either Otaki or Kashiwagi, and in further view of U.S. Patent No. 4,407,855 to Russell ("Russell") and U.S. Patent No. 5,194,490 to Suga et al. ("Suga") for the reasons set forth on pages 14-15 of the Office Action. Russell and Suga are relied on for teaching a polymerizable composition doped with 4% benzoyl peroxide and 0.1% dibutylaniline.

Russell relates to radiation curable coating compositions which when cured form highly abrasion resistant coatings for most any substrate (Col. 1, lines 10-13). The curable compositions include pentaerythritol-based polyacrylates and polymethacrylates, such as polyacrylates and polymethacrylates of pentaerythritol like the tri- and tetra-acrylates and methacrylates of pentaerythritol, polyacrylates and methacrylates of di- and tri-pentaerythritols like dipentaerythritol penta- and hexa-acrylate and dipentaerythritol penta- and hexa-methacrylate and tripentaerythritol octa-acrylate and methacrylate as well as mixtures of the above polyacrylates and polymethacrylates (Col. 3, lines 9-19). A photoinitiator is added to the composition to initiate crosslinking or curing upon irradiation (Col. 2, lines 38-39). Small amounts of a peroxide such as benzoyl peroxide may act as a photoinitiator by initiating crosslinking or curing of the compositions (Col. 2, lines 47-49).

Suga describes a preparation process of a polymeric solid electrolyte which gives a desired curing rate after mixing component A with component B and additionally can also control with ease an initial curing rate that can be provided in the entire absence of a solvent which remains after finishing the polymerization reaction and is required to be removed (Col. 1, lines 50-57). Radical polymerization promoters include anilines (Col. 3, line 24) and benzoyl peroxide (Col. 5, lines 10-11).

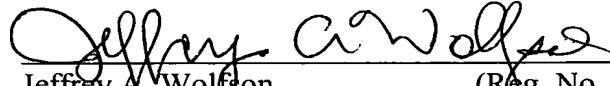
Claim 34 depends from claim 1, and because claim 1 is not obvious over WO Glushko in view of either Otaki or Kashiwagi, claim 34 is also not obvious over the references. Russell and Suga do not remedy the deficiency of the disclosure of the three references. Claims 38 and 47 are also not obvious over WO Glushko in view of either Otaki or Kashiwagi, and further in view of Russell and Suga, for the reasons discussed above.

In view of the above, it is clear that all obviousness rejections have been overcome and should be withdrawn. Accordingly, Applicants respectfully submit that the claims are patentably distinct from the cited references so that all rejections under 35 U.S.C. § 103(a) should be reconsidered and withdrawn.

Accordingly, the entire application is now in condition for allowance, early notice of which would be appreciated. Should the Examiner not agree with the Applicants' position, then a personal or telephonic interview is respectfully requested to discuss any remaining issues and expedite the eventual allowance of the application.

Respectfully submitted,

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